

CLAIMS

1. An electrolyte membrane-electrode assembly for a fuel cell, the assembly comprising: a proton conductive electrolyte membrane; a pair of catalyst layers for contact with both surfaces of said proton conductive electrolyte membrane, respectively; and a pair of gas diffusion layers for contact with said catalyst layers, respectively, each of said catalyst layers comprising a polymer electrolyte and a catalyst carried by an electrically conductive catalyst carrier, wherein said catalyst layer has such a density as to decrease from side thereof at said proton conductive electrolyte membrane to side thereof at said gas diffusion layer, and has such a weight ratio of said polymer electrolyte to said catalyst as to be substantially constant from side thereof at said proton conductive electrolyte membrane to side thereof at said gas diffusion layer.

2. A fuel cell using the electrolyte membrane-electrode assembly according to claim 1.

3. A method of making an electrolyte membrane-electrode assembly for a fuel cell, the method comprising the steps of: preparing a mixture comprising at least a polymer electrolyte and a catalyst carried by a catalyst carrier; forming, on a transfer sheet, a thin film of said mixture; transferring said thin film onto at least one major surface of a proton conductive electrolyte membrane, thereby forming a catalyst thin film layer on said major surface of said proton

conductive electrolyte membrane; repeating said transferring step at least once for forming at least one further catalyst thin film layer on said catalyst thin film layer, thereby forming a catalyst layer comprising a plurality of catalyst thin film layers; and providing a gas diffusion layer on said catalyst layer, wherein said transferring step causes said plurality of catalyst thin film layers in said catalyst layer to have such densities as to sequentially decrease from the one thereof at side of said proton conductive electrolyte membrane to the one thereof at side of said gas diffusion layer.

4. The method of making an electrolyte membrane-electrode assembly according to claim 3, wherein said transferring step comprises a thermal transfer process.

5. The method of making an electrolyte membrane-electrode assembly according to claim 3, wherein said transferring step comprises a pressing process for pressing respective ones of said plurality of said catalyst thin film layers toward said proton conductive electrolyte membrane.

6. A method of making a fuel cell using the method of making an electrolyte membrane-electrode assembly according to claim 3.